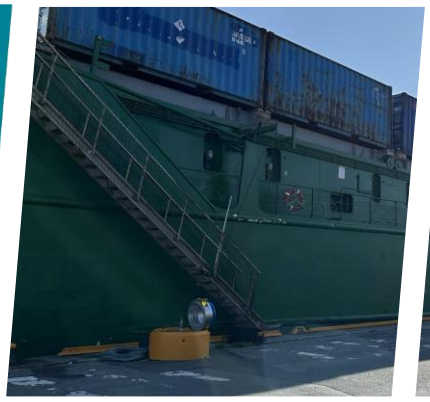
Norwegian Safety Investigation Authority



Published April 2024

REPORT Marine 2024/06

Marine casualty involving fall onboard the ro-ro ship Link Star in the Port of Trondheim, 14 September 2023

Norwegian Safety Investigation Authority • P.O. Box 213, NO-2001 Lillestrøm • Phone: +47 63 89 63 00 • nsia.no • post@nsia.no

The Norwegian Safety Investigation Authority (NSIA) has compiled this report for the sole purpose of improving safety at sea.

The object of a safety investigation is to clarify the sequence of events and causal factors, elucidate matters of significance for the prevention of maritime accidents and improvement of safety at sea, and to publish a report with possible safety recommendations. The NSIA shall not apportion any blame or liability.

Use of this report for any other purpose than for improvements of the safety at sea shall be avoided..

Photo: NSIA

This report has been translated into English and published by the NSIA to facilitate access by international readers. As accurate as the translation might be, the original Norwegian text takes precedence as the report of reference.

Table of contents

Notification of the accident

On Thursday 14 September 2023, the Norwegian Safety Investigation Authority (NSIA) was notified of an accident involving the ro-ro ship[1] 'Link Star', which was moored in the Port of Trondheim; see Figure 1. A fatal accident was reported involving the death of a crew member due to a fall.

The NSIA initiated a safety investigation and travelled to Trondheim the day after the accident to conduct interviews of the crew and obtain information.

Figure 1: The red cross shows where the accident occurred. Map: Kystinfo. Norwegian Coastal Administration/NSIA

[1] *roll-on/roll-off*

Summary

On 14 September 2023, a crew member aboard the ro-ro ship ‘Link Star’ fell from a cargo lift and died. The accident happened in connection with the completion of an unloading operation in which the second officer went ashore to get the cargo documents and a cargo claim form co-signed by a stevedore. When the second officer was going back into the ship again, he left the quay and went back to the ship through the open cargo hatch, via the dock fender and down onto the aft lift platform, he fell down the lift shaft and landed on the forward lift platform parked on the lower cargo deck.

The gangway, which was meant to be used for passage to and from shore, had not been deployed at the time of the accident. The NSIA believes that the design involving a long walk and roundabout path from the cargo decks where the unloading took place, to the quay via the gangway, was inexpedient for the signing to be carried out on the quay. This meant that the crew used the cargo lifts as a shortcut and access route, even though this was not intended or designed for safe passage.

The investigation has shown that there was a significant height difference between the quay and the cargo lift. These conditions made accessing the ship via the dock fender and the cargo lift a risky operation. Since the gangway was not in use that day, exiting via the cargo lift was the only available option for getting ashore.

The NSIA considers it unfortunate that other solutions are not used for getting cargo documents signed, such as electronic signing. This design makes it possible to go back and forth to the quay using the cargo lifts, and this is perceived by the crew as a shortcut. Similar use of cargo lifts on similar ships has also been observed in other ports, which shows that others also regard this as a possible access route. If no other working method is found for getting cargo documents signed, it is likely that the cargo lift and side hatch will continue to be used as an access route, and a similar accident may occur in the future.

The NSIA makes one safety recommendation to the shipping company to change the working method for getting cargo documents signed to prevent cargo lifts being used for personnel transport.

About the investigation

Purpose and method

The NSIA has classified the incident as very serious based on the definition in the Norwegian Maritime Code. The purpose of this investigation has been to clarify what caused a crew member to fall down a cargo lift in connection with the completion of an unloading operation. The NSIA has also considered what can be done to improve safety and prevent similar incidents in the future.

The accident and the circumstances surrounding it have been investigated and analysed in line with the NSIA's framework and analysis process for systematic safety investigations (the NSIA method[2]).

Sources of information

The factual information is based on interviews with the crew, as well as information from the shipping company and from port operators serving similar ships.

The investigation report

The first part of the report, 'Factual information', describes the sequence of events, related data and information gathered in connection with the accident, what the NSIA has investigated and related findings.

The second part, the 'Analysis', contains the NSIA's assessment of the sequence of events and contributory factors based on factual information and completed investigations/examinations. Circumstances and factors found to be of little relevance to explaining and understanding the accident will not be discussed in any detail.

The final part of the report contains the NSIA's conclusions and safety recommendation.

[2] *See https://www.nsia.no/About-us/Methodology*

1. Factual information

1. Factual information

1.1 Sequence of events

On Thursday 14 September 2023, the ro-ro ship ‘Link Star’ was moored in the Port of Trondheim for unloading. The ship arrived at 14:20, and had scheduled departure later the same day.

After mooring, the crew started unloading at approximately 14:30, through a cargo hatch midship on the starboard side; see Figure 2.

The second officer oversaw the operation through the hatch from the upper cargo deck. A forklift moved the cargo to two separate lift platforms in the lower cargo hold. The platforms were operated by a lift operator from a control room at the top of the hatch. The lift operator hoisted the platforms up to the upper cargo deck, so that they were positioned about one metre up from the quay and some way horizontally out of the hatch, thereby enabling the forklift operators on the quay to unload them; see Figure 3.

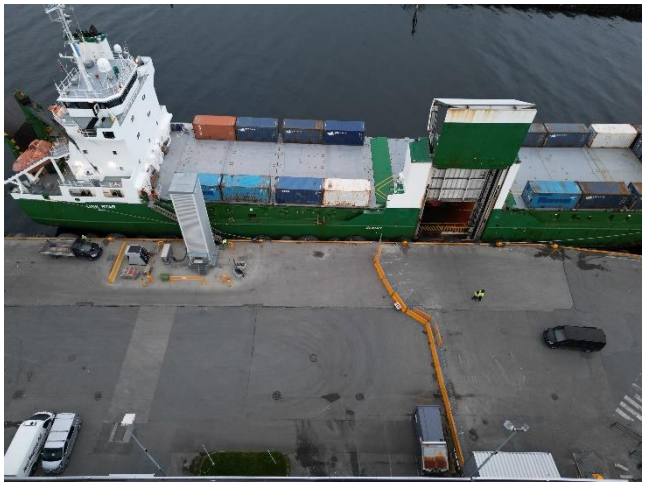


Figure 2: ‘Link star’ with open cargo hatch after the accident. Photo: The police

Figure 3: The aft cargo lift is positioned to enable the forklift operators on the quay to lift off the cargo. Photo: The police

At 15:51, the unloading was almost completed and it was time for the second officer to go ashore to have the cargo documents and a cargo claim form signed by a stevedore, due to damage to one of the pallets. The aft lift platform was located slightly above the upper cargo deck, and the second officer used it to go ashore via the fenders on to the quay. See Figure 4, Figure 5 and Figure 6. Neither the gangway nor the pilot ladder had been deployed at this point.

Figure 4: The second officer overseeing the unloading. Photo: CCTV Port of Trondheim

Figure 5: The second officer climbing out of the ship through the cargo hatch. Photo: CCTV Port of Trondheim

Figure 6: The second officer on the quay outside the cargo hatch. Photo: CCTV Port of Trondheim

At 15:58, after the documents had been signed on the quay, the second officer returned to the ship. The lift operator observed the second officer entering the ship through the cargo hatch and then going down to the edge of the shortest side of the aft lift platform, which was stationary and located flush with the upper cargo deck; see Figure 7 and Figure 8. At this point, the other lift platform was parked on the lower cargo deck approximately 4.5 metres further down. Note that the vessel was approximately 68 cm lower in the water when the police took photos, and that there was thus shorter distance from the cargo deck to the quay at the time of the accident than shown in the photos.

Figure 7: The aft cargo lift was stationary and flush with the upper cargo deck at the time of the accident. Photo: The police

Figure 8: The aft cargo lift and the upper cargo deck seen from the edge of the quay. Photo: The police

When the second officer entered the vessel at approximately 16:00, he fell down the shaft and landed on the platform on the lower cargo deck; see Figure 9.

Figure 9: The lift shaft with the aft lift platform to the right of the photo, flush with the upper cargo deck. The forward lift platform parked on the lower cargo deck to the left of the photo. Photo: The police

A crew member who was cleaning the lower cargo deck had his back to the lift shaft and was standing a few metres away when he heard a thud behind him. When he turned around, he saw the second officer lying lifeless face down. The crew member called the captain, who arrived at the scene of the accident shortly afterwards. The emergency services were then notified and an ambulance arrived at 16:10 and initiated life-saving measures. The second officer was later pronounced dead. See Figure 10 for an illustration of the accident site.

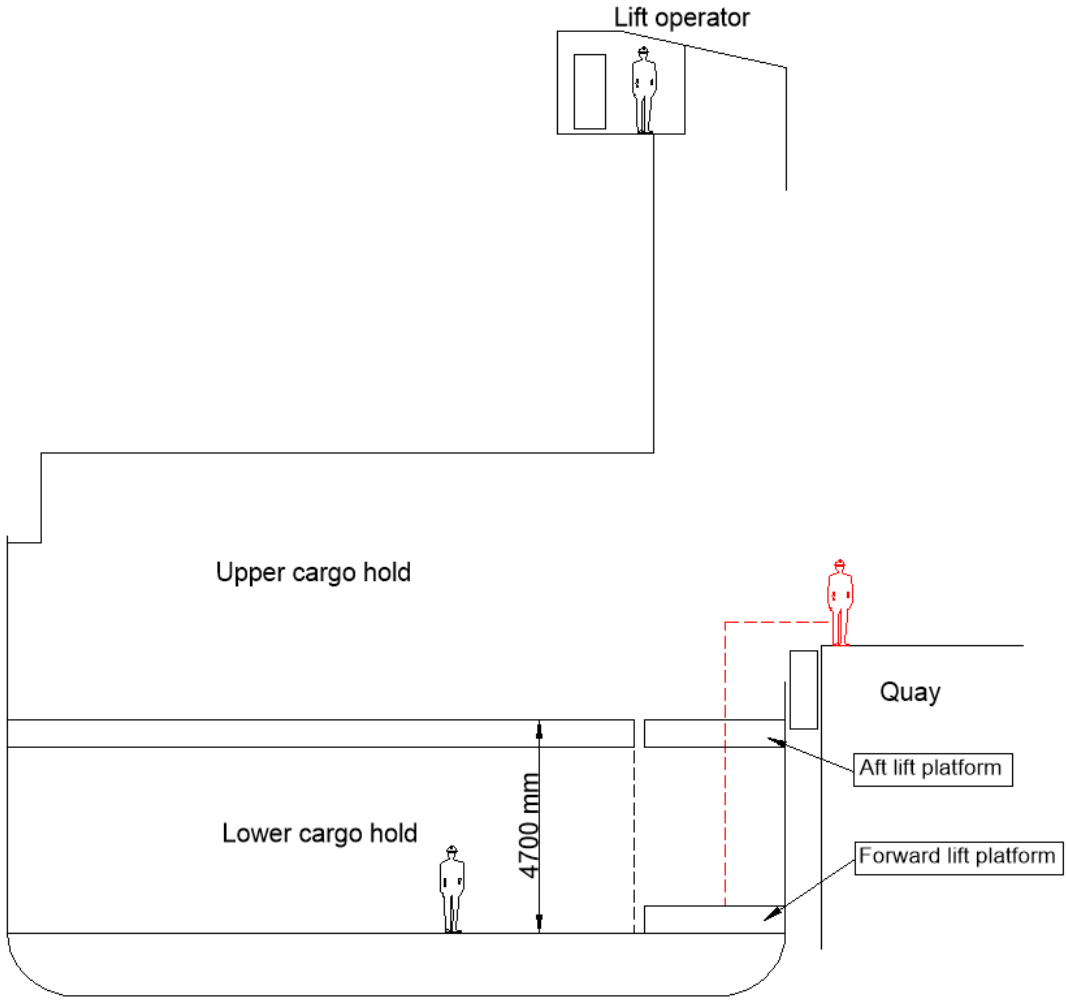


Figure 10: The cargo lift operator observed the second officer entering through the cargo hatch. A crew member was standing with his back to the lift platform in the lower cargo hold. The second officer fell approximately 4.5 metres from the aft lift platform down onto the forward lift platform. Illustration: NSIA.

1.2 Weather and sea conditions

Based on information from the Norwegian Metrological Institute, the temperature at the time of the accident was 12 degrees Celsius, there was no wind or precipitation, and the sea was calm in the Port of Trondheim.

1.3 Vessel

1.3.1 GENERAL INFORMATION

'Link Star' was registered in the Norwegian International Ship Register (NIS) in 2021. The vessel previously sailed under the Finnish flag. The vessel is a ro-ro ship that carries general cargo.

1.3.2 CARGO HATCH ARRANGEMENT

The vessel has one cargo hatch aft and one midship on the starboard side. The cargo hatch on the starboard side midship was used for loading and unloading at the time of the accident; see Figure 11. Two parallel cargo lifts were used for loading and unloading through the hatch from the ship's two cargo decks. No railings or other physical barriers were fitted on the cargo lifts. When both platforms were on the same level, there was a gap of about 30 cm between them.

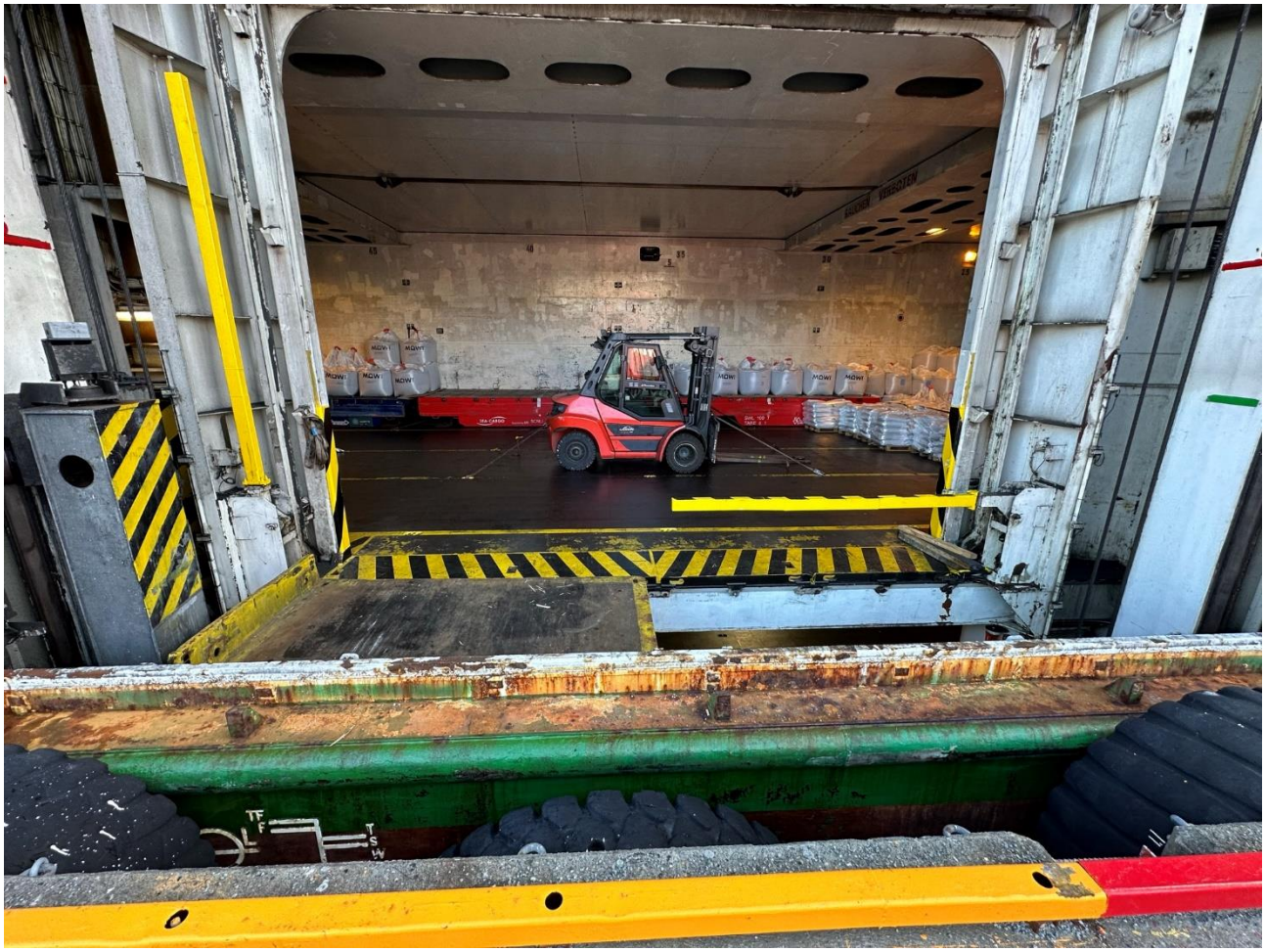


Figure 11: The side hatch with one of the cargo lifts on the upper cargo deck and one on the lower. The boom is lowered when the cargo lift is not flush with the cargo deck. Photo: NSIA

Along the edge of the upper cargo deck towards the lift shaft, there were warning stripes, a boom and a raised edge towards the shaft opening; see Figure 12. The two platforms were approximately 3.2 metres long and 1.8 metres wide, with a warning strip along each of the short

sides facing the lift machinery. The lift platforms can be moved up and down independently of each other.

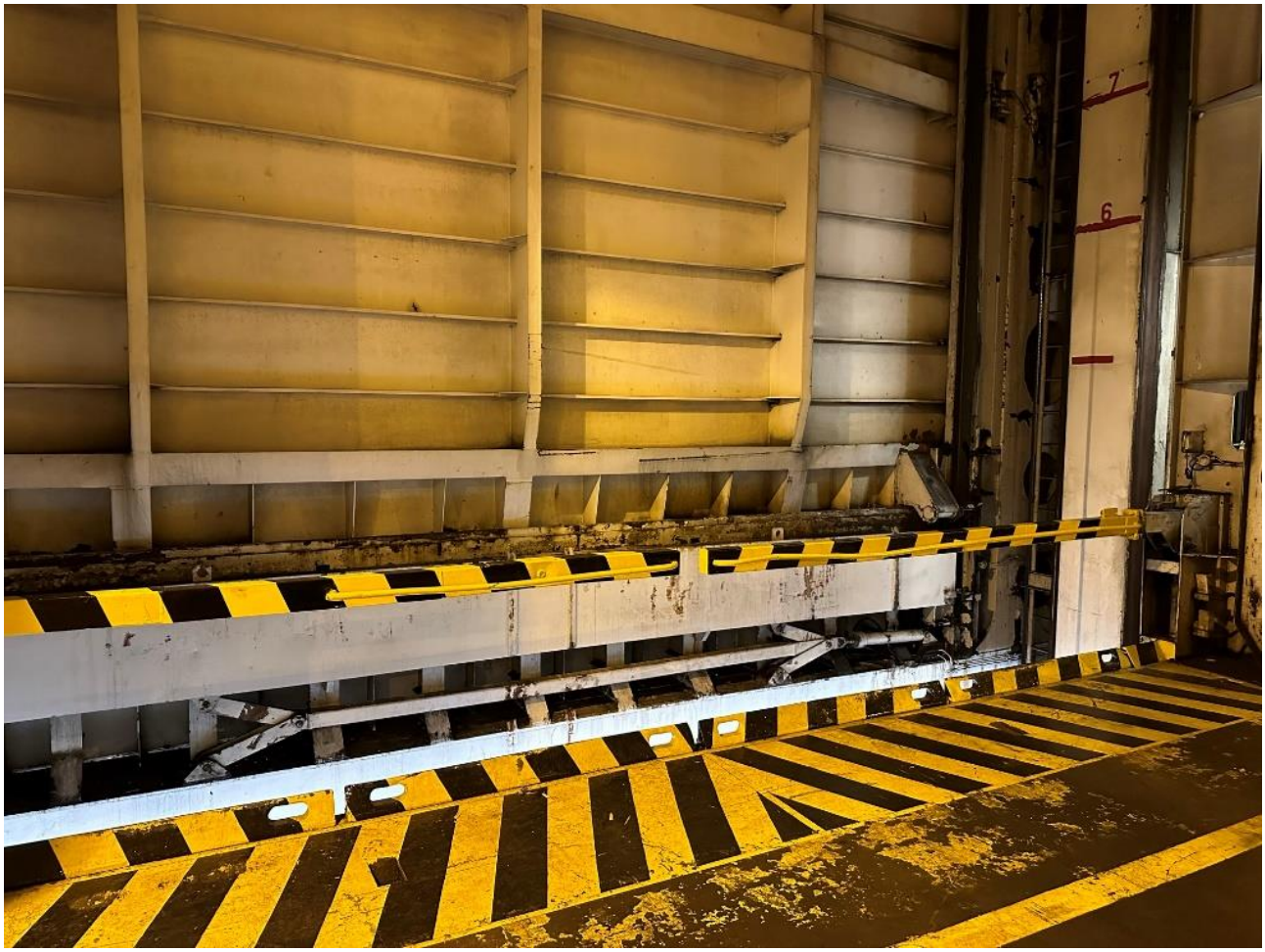


Figure 12: Boom, warning stripes and raised edge along the lift shaft opening on the upper cargo deck. The cargo hatch is closed. Photo: NSIA.

1.4 Operating conditions

1.4.1 THE VESSEL'S ROUTE AND PORT CALLS

The duration of the port calls varied depending on the type of operation and schedule.

In the period from 3 to 14 September 2023, from when the second officer signed on until the accident occurred, the vessel had made ten port calls, including the Port of Trondheim on the day of the accident.

1.4.2 CARGO LIFTS

The cargo lifts were operated manually by an operator from the control room on the upper cargo deck, in the upper part of the shaft; see Figure 13 and Figure 14. From the control room, the operator could see down the lift shaft through a plexiglas window. The operator was equipped with radio communication.

Figure 13: The control room can be seen at the top of the lift shaft. Photo: NSIA

Figure 14: The control room with a pexiglas window for looking down the shaft and out towards the quay. Photo: NSIA

The NSIA has been informed that the cargo lift was sometimes used for handover of cargo documents, especially during short port calls, because the gangway was normally deployed and used for longer calls and for visitors. Figure 15 shows how the cargo was transported via the cargo lifts. The NSIA has also been informed that during the coronavirus period when physical contact was not permitted, the vessels used electronic signing of cargo documents, including claim forms in the event of damage to cargo.

Figure 15: The cargo was transported via the cargo lifts to be picked up by forklifts on the quay. Photo: CCTV from Port of Trondheim

1.5 The crew

The vessel had a crew of 12 on board.

The second officer signed on on 3 September 2023. This was his first contract with the shipping company Norwest Ship Management AS and on this type of ship, but he had previous seagoing experience.

At the time of the accident, the second officer was wearing protective footwear, coveralls and a hardhat.

1.6 Medical factors

The forensic autopsy concluded that the second officer's injuries and cause of death were consistent with a fall from a significant height.

An overview of the registration of his working hours and rest periods showed no non-conformities.

No medical or health information has emerged about the second officer that is considered relevant to the accident.

1.7 Technical investigations

1.7.1 MAPPING OF INDUSTRY PRACTICE FOR PASSAGE BETWEEN QUAY AND SHIP

As part of the investigation, the NSIA has mapped practices for passage between quay and ship for vessels similar to 'Link Star', i.e. ro-ro vessels that carry general cargo and have a hatch midship with a cargo lift inside. The NSIA contacted other Norwegian port facilities, port terminals and operators that perform maritime logistics services and stevedores who perform services for similar ships.

The investigation has shown that practices varied between the various port facilities that the NSIA contacted. Some reported that the crew only used the gangway at their port, while others stated that the crew on ships often used the lifts as access routes.

In some cases, it depended on the design of the quay, as it was not always possible to both deploy the gangway and load and unload via the ro-ro ramp due to the quay being too short.

1.8 Shipping company and safety management

1.8.1 GENERAL INFORMATION

The shipping company Norwest Ship Management AS owns seven ships, five of which have a similar design with a side hatch and cargo lift.

1.8.2 SAFETY MANAGEMENT

The shipping company had established a quality and safety management system that was designed to meet the requirements set out in the Regulations of 5 September 2014 No 1191 on safety management systems for Norwegian ships and mobile offshore units. Among other things, the system was intended to ensure that the shipping company's operations met requirements relating to safety at sea, and that mandatory rules and regulations were complied with.

The safety management system was made available to the crew on board. The shipping company's safety management was required to be aligned with the ISM Code, and the captain was responsible for ensuring that the crew were familiar with the ISM Code.

1.8.3 FAMILIARISATION AND TRAINING

Safety reviews and department-specific familiarisation checklists were used on board to document the training of crew members and ensure the necessary familiarisation. New crew members who were to carry out deck work were required to sign a deck familiarisation form issued by the shipping company. The points to be checked included a review of work permits, risk assessments and toolbox talks, as well as job-specific check-off points. The second officer had signed this document.

Procedure '7.3.3 2nd Officer' in the safety management system described the second officer's main duties and responsibilities. Among other things, it set out that the second officer on duty was responsible for loading operations.

1.8.3.1 Procedures for work involving use of the lift platforms

The quality and safety management system in procedure '7.4.27 Health, environment and safety (HSE)' specifies that it is not permitted to use cargo lifts to transport personnel or to access the platforms during loading and unloading. Procedure '7.4.21 Permit to Work' states that it is not permitted to use cargo lifts to transport personnel during normal loading and unloading, nor to be on the platforms. During maintenance work, the lift platforms were to remain at lower cargo deck level.

1.8.3.2 Risk assessment

The shipping company had defined a series of high-risk operations for which documented risk assessments had been carried out. Lift operations were included as one of these, but fall from platforms were not identified as a risk.

1.9 Rules and regulations

The rules and regulations of relevance to this incident are described in the sections below.

1.9.1 REGULATIONS ON SAFETY MANAGEMENT SYSTEM FOR NORWEGIAN SHIPS AND MOBILE OFFSHORE UNITS

The Regulations of 5 September 2014 No 1191 on a safety management system for Norwegian ships and mobile offshore units were adopted under the legal authority of the Ship Safety and Security Act and implement the International Safety Management Code (ISM) in Norwegian legislation.

According to the ISM Code Part A, 1 General, section 1.2.2, the company's safety management objectives should, inter alia, provide for safe practices in ship operation and a safe working environment.

1.9.2 REGULATIONS ON THE WORKING ENVIRONMENT, HEALTH AND SAFETY OF PERSONS WORKING ON BOARD SHIP

The objective of the Regulations of 1 January 2005 No 8 concerning the working environment, health and safety of persons working on board ships is to ensure that work and off-duty time on board is arranged and organised so that the safety and physical and mental health of those working on board is ensured in accordance with the technological and social development of society.

Section 2-2 sets out a requirement for carrying out risk assessments, including that hazards on board shall be identified. If a risk to the safety and health of persons working on board is identified, the necessary measures shall be taken to eliminate or reduce the hazards.

1.10 Supervision of the shipping company and vessel

1.10.1 THE NORWEGIAN MARITIME AUTHORITY

1.10.1.1 Vessel inspection

The Norwegian Maritime Authority (NMA) had not carried out any on-board inspections since the vessel was registered in Norway in 2021 until the day of the accident. After the accident, the NMA issued an order to the shipping company to evaluate its procedures for familiarisation and training of new personnel.

1.11 Previous accidents/incidents

1.11.1 MS SVEALAND

In report 2014/02 on the fatal accident on board the general cargo ship MS 'Svealand' on 3 April 2012, a crew member fell five metres when he attempted to access the quay using the cargo lift. The NSIA (then called the AIBN) pointed out the following:

> *The AIBN believes that the shipping company has not carried out an adequate risk assessment of the use of cargo lifts for loading and unloading operations and as a means of accessing the quay. The cargo lift in the side door was used for passage to and from the quay without a risk assessment having being carried out or without the issue having been considered in relation to other access between the ship and the quay.*

1.12 Measures implemented

The shipping company has informed the NSIA that they have implemented the following measures after the accident:

- On-board meeting with the crew – where the crew have signed that they have understood the risks of using the cargo lifts and surrounding area.
- Revised familiarisation form to include cargo lifts and associated risks. Added text to the maintenance procedure – 'In case maintenance, both platforms shall be on tanktop'.

2. Analysis

2. Analysis

2.1 Introduction

The accident on board ‘Link Star’ happened in connection with the completion of an unloading operation, where a crew member fell from a cargo lift and died. There have been several falls with fatal outcomes in recent years, and it is therefore important to identify the factors that played a role in this incident, to be able to prevent similar accidents.

The analysis starts by assessing the sequence of events and the immediate causes. Design and practices on board are then considered, with regard to passage to and from the quay during unloading operations.

2.2 Sequence of events

The accident occurred when the unloading operation was completed, and the second officer was returning to the ship after getting a stevedore in the Port of Trondheim to sign the cargo documents. The second officer entered the ship through the open cargo hatch, via the dock fender and down onto the aft lift platform, when he fell down the lift shaft and landed on the forward lift platform parked on the lower cargo deck. Witness statements and CCTV footage did not provide sufficient information to determine exactly what caused the fall.

The investigation has shown that there was a significant height difference between the dock fender along the quay and the cargo lift. This meant there was quite a drop from the deck itself to the cargo lift, in addition to the fact that the dock fender that was probably used was positioned between the two platforms. These factors made accessing the ship via the dock fender and the cargo lift a risky operation. The NSIA believes this shortcut to and from the quay was used to save time, and because it was considered the easiest way of getting the cargo documents signed. Since the gangway was not in use that day, exiting via the cargo lift was also the only option for getting from the vessel to the quay area.

The crew considered getting cargo documents signed to be a routine operation. Therefore, no risk mitigation measures had been considered or identified for this operation or guidelines drawn up for how it should be carried out. This was probably because the cargo lifts were not meant to be used as an access route. This will be discussed in more detail in section 2.3 on practices on board. Nor was there an efficient alternative to handing over cargo documents in person that did not involve deploying the gangway from the cargo deck, up to the freeboard deck via ladders, and further aft towards the wheelhouse where the gangway was located; see Figure 16. This is a significant detour for crew members on the cargo deck. The vessel’s design will be discussed in more detail in section 2.4.

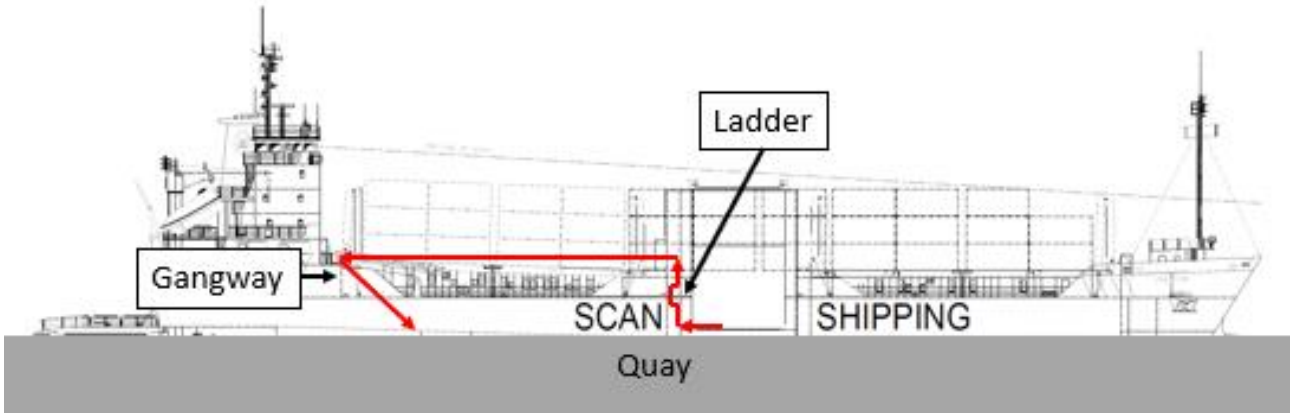


Figure 16: Access route from the upper cargo deck to the quay via the gangway. Illustration: Shipping company/NSIA

2.3 Practices on board

In the regulation for safety management system for ships etc. there is a requirement to safety management system on board, and the regulations on the working environment, health and safety of persons working on board ships has the objective to ensure that work and off-duty time on board is arranged and organised so that the safety and physical and mental health of those working on board is ensured, see chapter 1.9. The shipping company's management system described that it was not permitted to use the lift platforms for personnel transport or to access the platforms during loading and unloading. The crew members were aware that they were supposed to use the gangway for passage between the ship and the quay.

The investigation has shown that it was not uncommon for the crew to move between the ship and the quay using the cargo lifts as an access route when handing over and getting cargo documents signed, especially during short port calls or where the design of the quay made it difficult to deploy the gangway. The ship's on-board management had also observed and was familiar with this practice.

The NSIA has been informed that disembarkation using the cargo hatch was considered a potential risk, and that each crew member had to act with caution and assess whether it was safe. This suggests that the crew understood the risk associated with taking this shortcut, but that the practice was accepted because they 'exercised caution'.

2.4 The vessel's design for passage to and from the quay during unloading operations

The design involving a long walk and roundabout path from the upper and lower cargo deck where the unloading took place, to the quay via the gangway, was inexpedient for getting the cargo documents signed. It led to the crew using the cargo lifts as a shortcut and access route.

The NSIA considers it unfortunate that no other solutions are used for getting cargo documents signed that do not require the crew to move between the vessel and the quay. It has also emerged that crew members using cargo lifts on similar ships as access routes has been observed in other ports. This shows that others also regard this as a possible access route.

If no other working method is found for getting cargo documents signed, the NSIA believes it is likely that the cargo lift and side hatch will continue to be used as an access route, and that a similar accident may occur in the future.

The shipping company has stated that, during the pandemic, all cargo documents, including damage forms, were signed electronically, so this could be an alternative means of carrying this out. The shipping company has therefore stated that they will look at the possibility of changing the working method for execution of this task. As this is not an implemented measure, the NSIA makes one safety recommendation to the shipping company to change the working method for getting cargo documents signed to prevent cargo lifts being used to transport personnel.

3. Conclusion

3. Conclusion

The accident happened when an unloading operation had been completed, and the second officer was returning to the ship via the cargo lift after getting a stevedore in the Port of Trondheim to sign cargo documents.

The investigation has shown that there was a significant height difference between the dock fender along the quay and the cargo lift. These conditions made accessing the ship via the dock fender and the cargo lift a risky operation This shortcut to and from the quay was used to save time and because it was considered the easiest way of getting the cargo documents signed.

The gangway, which was meant to be used for passage to and from shore, had not been deployed at the time of the accident. The NSIA believes that the design involving a long walk and roundabout path from the cargo deck where the unloading took place, to the quay via the gangway, was inexpedient for the signing to be carried out on the quay. This meant that the crew used the cargo lifts as a shortcut and access route, and that this working method was accepted because they ‘exercised caution’.

The NSIA considers it unfortunate that other solutions are not used for getting cargo documents signed that do not require the crew to move between the vessel and quay. The design makes it possible to go back and forth to the quay using the cargo lifts, and is perceived by the crew as a shortcut. It has also emerged that observations have been made in other ports of cargo lifts on similar ships being used by crew members as an access route. This shows that others also regard this as a possible access route. If no other working method is found for getting cargo documents signed, the NSIA believes it likely that the cargo lifts and side hatch will continue to be used as an access route and a similar accident may occur again.

4. Safety recommendations

4. Safety recommendations

The Norwegian Safety Investigation Authority proposes the following safety recommendation[3] for the purpose of improving safety at sea:

Safety Recommendation Marine No. 2024/20T

On Thursday 14 September 2023, an accident occurred involving the ro-ro ship ‘Link Star’, which was moored in the Port of Trondheim. A crew member fell from a cargo lift and died as he was returning to the ship after getting cargo documents signed.

The investigation has shown that there was no efficient alternative to handing over cargo documents in person that did not involve deploying the gangway from the cargo deck, walking up to the freeboard deck via ladders, and further aft towards the wheelhouse where the gangway was located. This meant that the crew used the cargo lifts as a shortcut and access route, and that this working method was accepted because they ‘exercised caution’. If no other working method is implemented for getting cargo documents signed, it is likely that the cargo lifts and side hatch will continue to be used as an access route and a similar accident may occur in the future.

The Norwegian Safety Investigation Authority recommends that Norwest Ship Management AS change the working method for getting cargo documents signed to prevent cargo lifts being used for personnel transport.

Norwegian Safety Investigation Authority
Lillestrøm, 16 April 2024

[3] The Ministry of Trade, Industry and Fisheries has the overall responsibility for following up the safety recommendations

Appendices

Appendix A Details of the vessel and the accident

Vessel	
Name	Link Star
Flag state	Norway (NIS)
Classification society	DNV
IMO number/Call sign	8805602/LAPA8
Type	General cargo ship: roll-on/roll-off
Build year	1989
Owner	Norwest Ship Management AS
Operator / Responsible for ISM	Norwest Ship Management AS
Construction material	Steel
Length	99.68 metres
Gross tonnage	5,627
Voyage	
Port of departure	Valsneset (Ørland municipality)
Port of arrival	Trondheim
Type of voyage	Coastal voyage
Cargo	General cargo
Persons on board	12
Information about the accident	
Date and time	14 September 2023, at 15:58
Type of accident	Very serious occupational accident, fall on board.
Location/position where the accident occurred	Port of Trondheim
Place on board where the accident occurred	In the lift shaft amidships on the starboard side
Injuries/fatalities	One crew member died
Ship operation	Unloading
At what point in the voyage was the vessel	Docked
Environmental conditions	At the time of the accident, the temperature was 12 degrees Celsius, there was no wind or precipitation and the sea was calm.